STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

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MEMORANDUM TO: Bonner Bridge Piping Plover Monitoring Plan Task Force:

Mr. James F. Parnell, Ph.D., Consulting Biologist
Ms. Kim Tripp, Fish and Wildlife Service, Raleigh
Mr. Dennis Stewart, Fish and Wildlife Service, Manteo
Ms. Marcia Lyons, National Park Service
Mr. David Allen, Wildlife Resources Commission
Mr. Hal Bain, Department of Transportation
Mr. R. E. Capehart, P.E., Department of Transportation
Ms. Gail Grimes, P.E., Department of Transportation

FROM: M. Randall Turner, Division Environmental Officer
Planning & Environmental Branch-Division One

SUBJECT: Final Piping Plover Monitoring Plan for the Proposed Replacement of the Herbert C. Bonner Bridge (Bridge No. 11) over Oregon Inlet on NC 12 in Dare County; TIP No. B-2500; Federal Aid Project No. BRS-2358(15); State Project No. 8.1051201

The final Piping Plover Monitoring Plan is enclosed for your consideration. Draft versions of the document were sent to you previously by Jim Parnell. Any comments you made have been incorporated into this final product.

Plans are to coordinate with the Alligator River National Wildlife Refuge and the Cape Hatteras National Seashore for the purposes of developing a collection agreement that will result in a qualified person being recruited by either (or both) of these agencies so that the monitoring study can get underway. The Department also plans to discuss with Jim Parnell the possibility of his continued involvement as a technical advisor, quality control coordinator, etc.

The Department is very appreciative of your time and particularly the time and efforts of Jim Parnell in putting this plan together. Please call me if you have any questions or comments.

Enclosures
cc: William D. Gilmore, P.E., NCDOT
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Piping Plover (*Charadrius melodus*) monitoring

at Oregon Inlet, North Carolina

This report recommends a plan of monitoring Piping Plovers adjacent to Oregon Inlet relative to activities associated with the construction of a new bridge across the inlet.

Piping Plovers are known to occur on the beach and sand flats adjacent to Oregon Inlet both during their annual migration through the area and during the nesting season. Monitoring, therefore will be needed from 1 March through October each year. Monitoring should begin one full year prior to initiation of construction of the new bridge and continue throughout the construction period of the new bridge and demolition of the present bridge. Monitoring should include the beach and dunes beginning at the ramp just north of the bridge and continuing under the present bridge on the north side of the inlet and on the south side of the inlet past the groins and disposal area on the north end of Pea Island.

The basic questions to be answered are:

1. Are piping plovers using areas adjacent to Oregon Inlet where they may be affected by construction of a new bridge and demolition of the present bridge?
2. If piping plovers are found to be present in this area prior to initiation of bridge construction/demolition:
    A. How many are present, how regularly, and at what times of year?
    B. What habitats are they using?
    C. How are they using the area (feeding, loafing, roosting, courting, breeding,

rearing chicks)?

D. If the birds are nesting in the area how successful are they?

3. If piping plovers are using the area adjacent to the bridge prior to construction/demolition, how is this use affected by the process?

4. If nests are located during construction/demolition, what action is appropriate to ensure that they are not destroyed.

Period of monitoring:

Piping Plovers are known to use the beaches in the Oregon Inlet area during Spring, Summer and Fall. Monitoring will therefore begin on 1 March and will continue through October each year, beginning one year prior to bridge construction/demolition and continuing throughout the period of construction.

Timing of monitoring will be as follows:

March: The study area will be surveyed three times each week, during low tide. During each survey, all piping plovers seen will be recorded according to location (using GPS unit and map) and habitat. Activities at time of observation (feeding, loafing, courting, etc.) and basic weather data, tide and time will be recorded for each observation. Human activities in the study area will also be recorded and categorized during each survey. This will include counts of vehicles, fishermen, etc. and will include activities relative to bridge construction/demolition. During those weeks when Piping Plovers are encountered on the low tide surveys, high tide surveys will also be accomplished to determine numbers, locations, and habitats of loafing or roosting birds. Time budgets will also be developed to provide additional data on how the plovers are utilizing the area.

April - July: During the breeding season, surveys will continue as outlined above for March. If piping plovers use the area for breeding, all territories established will be mapped and searches will be initiated for nests. All nests found will be located on maps and by GPS. All nests will be monitored to determine clutch size, hatching success and causes of egg or nest failure when possible. Whenever possible, determination of clutch size and hatching success will be accomplished without displacing adults at the nest. Broods will be monitored after they depart the nest to determine what areas and habitats are being used. Monitoring will be done from a distance with binoculars and spotting scopes, and observer disturbance will be kept to a minimum. Fledging success will be determined when possible. Time budgets will be developed for adults and chicks during the reproductive period.

August - October: Monitoring will be continued as in March, as soon as all reproductive activity has been completed. If unfledged chicks remain in the area, monitoring will continue according to the nesting season schedule. Secondary goals and work plans may be developed if breeding piping plovers are not present in the study area during one-or-more seasons or if time is available after the primary monitoring goals are accomplished.

Monitoring methodology:

Monitoring will be accomplished using standard field techniques (see the final project report to the Cape Hatteras National Seashore entitled *Factors affecting reproduction and migration of waterbirds on the North Carolina barrier islands* by J. A. Collazo, J. R. Walters and J. F. Parnell). The basic surveys will involve driving and/or walking the upper beach from one end of the study area to the other, beginning as soon after the mid-point of the falling tide as is practical and completing the survey prior to the mid-point of the rising tide. All exposed intertidal

areas will be carefully searched for feeding Piping Plovers. Alternate surveys will begin at the Bodie and Pea island ends of the study area. High tide surveys will be similar but will fit into the period between the mid-point of the rising tide and the mid-point of the falling tide. These surveys will search supratidal areas that may be suitable for roosting. All surveys will be conducted between 30 minutes after sunrise and 30 minutes before sunset during periods of no significant precipitation and with wind speeds of less than 20 miles per hour. Standardized data sheets will be developed to assure that information recorded is consistent and comparable throughout the study. All piping plovers will be recorded according to the habitat being used and their approximate locations will be recorded on field maps carried on each survey. Hand-held GPS units may also be used to provide approximate coordinates for each bird or group of birds encountered. All human activities (vehicles, fishermen, walkers, construction activities, etc.) will be recorded during each survey.

If reproductive activities are encountered, the location of all courting birds, territories, and nests will be located on the field maps and approximate locations plotted using the GPS unit. If nests are found, a 50 meter avoidance buffer area will be delineated around each nest and marked with warning signs and symbolic fencing. Fencing will remain in place as long as viable eggs or unfledged chicks are present. Each nest site will be visited every other day during incubation to evaluate reproductive success. On each visit, presence or absence of adults will be noted and nest contents will be recorded, if possible without flushing the adult from the nest. If a loss of eggs or total destruction of the nest is recorded, the observer will attempt to determine the cause of egg loss or nest failure. If eggs hatch, the observer will attempt to locate and monitor each brood at 2-day intervals between mid-low and mid-high tide to determine where they feed and during the

period between mid-rising and mid-falling tide to determine roosting sites. Feeding and roosting areas will be located on field maps and a 200 meter vehicle-free area around the feeding area will be marked with warning signs and symbolic fencing. This area should be adjusted as needed should the brood move beyond the marked area. Should these exclusion zones conflict with construction/demolition activities immediate contact should be made with the US Fish and Wildlife Service office in Raleigh and with NCDOT to initiate consultation to solve the problem.

Time budgets will be developed for the migratory period and, if nests are found, for adults and chicks during the nesting season. During the migratory period, time budgets will be developed by a combination of scan and instantaneous sampling techniques used during surveys. When a Piping Plover or flock of Piping Plovers is located, and after location, habitat, disturbances, etc. are recorded, the observer will record the activity of the individual or the dominant activity of the flock as a scan sample (*i.e.* foraging, resting, running or walking, flying). Then an individual will be chosen at random, if there is more than one bird in view, for a focal sample, and its activities will be recorded at 10-second intervals during a five minute observation period. At the end of the five-minute sampling period a second bird will be selected for a focal sample, if another bird is in view; and another five-minute focal sample will be accomplished. At the completion of the second focal sample, a second scan sample will be taken. If only a single bird was in view, a second scan sample will follow the initial focal sample, and the survey will continue This alternation of scan and pairs of focal samples will continue until the survey is complete. If fewer than eight focal samples are accomplished during a survey (indicating that very few Piping Plovers were recorded on the survey), a second set of samples will be accomplished on the return trip. This means that some birds will be sampled twice during a survey.

During the breeding season. time budgets will be established by observing each nest or brood from a distance, using binoculars or spotting scope 4 times each week. Each observation period should be within a different quarter-tide unit (high tide to mid-falling, mid-falling to low, low to mid-rising, and mid-rising to high) and should be between sunrise and sunset. Sampling may be done during any weather so long as it is clear that the observer is not affecting the activities or well being of the birds being sampled. During each observation period, scan and focal sampling will again be employed. At the beginning of the sample period the nest site or activity site of the brood will be scanned and all individuals present will be counted and identified (adult or chick) and the dominant activity recorded. Then an individual will be randomly selected, assuming that more than one individual is present, and a five-minute focal sample will be taken. After the focal sample another scan sample will be taken, and then a second individual will be chosen randomly for a focal sample. This will continue until all individuals associated with the nest or brood have been sampled. Where fewer than 3 birds are present each individual will be subject to 2 focal samples. This sampling will continue as long as broods can be located and identified. The above plan assumes that there will be no more than 4 nests and/or broods in the study area. If there are more than 4 nests or broods, a sample of 4 nests or broods will be chosen from the total for this phase of the study. Priority will be given to nests or broods closest to bridge related activities and to having samples from both north and south sides of the inlet.

During all phases of this study, but especially during nesting, the well-being of the birds will be paramount, and the observer will be expected to adjust schedules and techniques if there are indications that the study is having an adverse impact on the behavior and/or nesting success of the birds. Short term modifications should be made by the observer as necessary. Long term

modifications must involve consultation with the project coordinator, the US Fish and Wildlife Service and NCDOT. Should the observer find that there is an ongoing or impending detrimental impact to a nest or to chicks out of the nest by activities associated with bridge construction/demolition there should be immediate contact by phone to the US Fish and Wildlife Service office in Raleigh and to NCDOT to discuss solutions.

Reporting:

At the end of each day the observer will make a duplicate set of all field data sheets, and at the end of each week one copy of all data sheets will be mailed to the project supervisor. A brief bi-weekly update of plover activities will also be sent to all members of the advisory committee. An interim report outlining the findings for that season will be prepared by the observer and project supervisor at the end of each season and submitted to the U. S. Fish and Wildlife Service and all members of the Oregon Inlet Piping Plover Monitoring Committee by 31 December of each year. A final report will be due on 1 June of the first year following the final year of the study.

Analysis:

Data analysis is expected to the straightforward. The first year of data, gathered prior to the beginning of bridge construction/demolition, will be the control data set. This will provide a background for data gathered during construction/demolition. Census data are straightforward and direct comparisons between years can be made. Time budget data can be analyzed either by direct comparison of the data gathered during control and test years using nonparametric analyses such as the Kruskal-Wallace test or by converting the data to percentages of time engaged in each activity and using a Chi^2 test to compare years.